

## Part 2 (Fuzzy)

### Problem (4)

(a) Show that the set  $A = \{x \mid \frac{1}{\sqrt{1+5x}}\}$  is convex

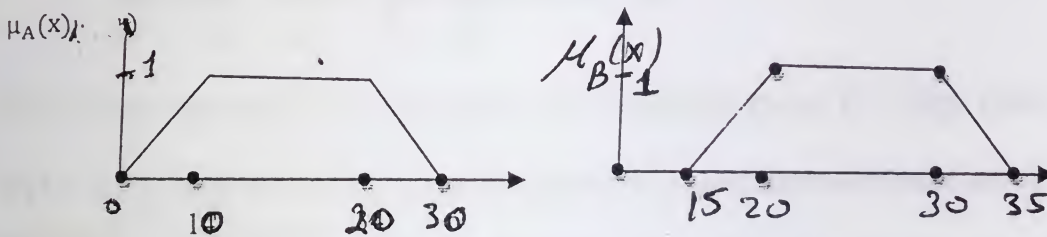
(b) Consider the fuzzy sets F and G defined in interval  $[0,10]$  by the memberships  $\mu_F = 2^{-x}$  and  $\mu_G = \frac{1}{1+10(x-2)^2}$ . Determine the mathematical formulas and graphs of

memberships functions of (i)  $\mu_{\bar{F}}$  and  $\mu_{\bar{G}}$  (ii)  $\mu_{F \cup G}$  and  $\mu_{F \cap G}$

(c) Find  $\sup(A)$ , center of A, height of A and relative cardinality of  $(\|A\|)$  where A is fuzzy set  $A = \frac{0.2}{a} + \frac{0.3}{b} + \frac{0.6}{c} + \frac{0.7}{d}$

### Problem (5)

(a) Let  $A = \{x \mid \mu_A(x)\}$ ,  $B = \{x \mid \mu_B(x)\}$  be fuzzy sets with memberships

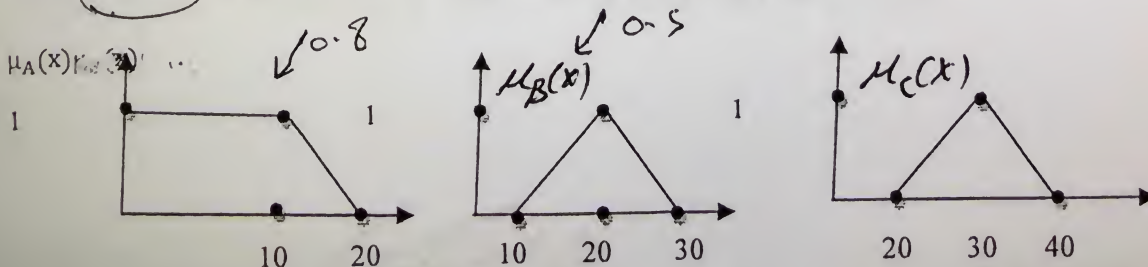


aggregate two fuzzy sets to defuzzify it to single most nearly value by centriod method

(b) A product with memberships represents, degree of high expensive  $\mu_A(x)$ , degree of medium expensive  $\mu_B(x)$  and degree of cheap

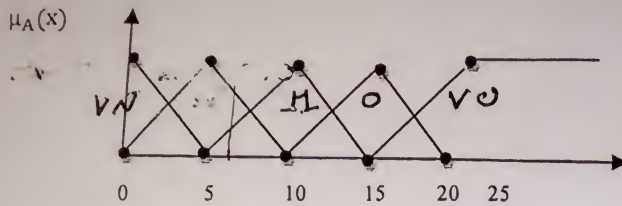
expensive  $\mu_C(x)$ . Use defuzzification methods to find suitable price, if

its medium degree is 0.5 and high degree 0.8 where

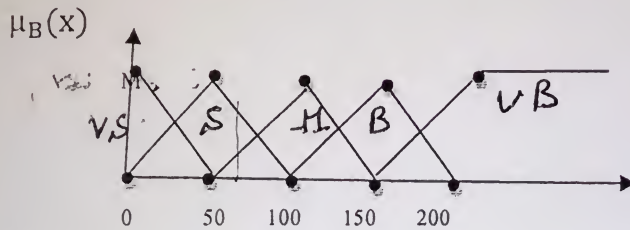


(c) A fuzzy system constructed to get the price of a car type with respect to car age and distance. The manufactured data say that this system has two inputs that are age and

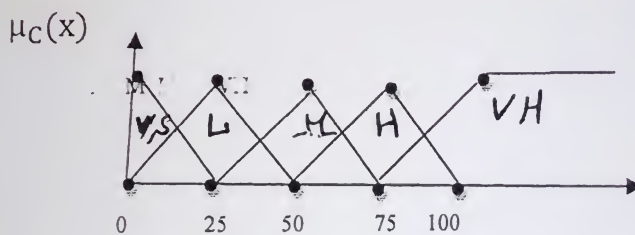
used distance, one output which is car price, where  $\mu_A(x)$ ,  $\mu_B(x)$  and  $\mu_C(x)$  are memberships represents car age, used distance by care and price with thousands



VN= Very new, N= new, M = medium, O = old, VO = Very old



VS = Very small, S= Small, M = medium, B = Long , VB = Very Long



VS = Very low price, L= Low price, M = medium price, H = high price ,

VH = Very high price. Try to get the price of a care manufactured since 6 year ago and used it in distance

80000 km .

(d) The fuzzy matrices is as follows

$$M_R = \begin{bmatrix} 0 & 0 & .8 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & .9 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \quad M_S = \begin{bmatrix} 0 & 0 & .8 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & .9 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Find fuzzy relation matrices  $M_{R \cup S}$ ,  $M_{R \cap S}$  and  $M_{R \circ S}$  corresponding  $R \cup S$ ,  $R \cap S$  and  $R \circ S$ , where  $R$  and  $S$  subsets of  $A \times B$ ,  $A = \{a, b, c, d\}$  and  $B = \{1, 2, 3, 4\}$

*Loop*

part 2

(Page 2/2)